



Fruit Fly Lab

Studying Fruit Flies in Space

Aboard the International Space Station

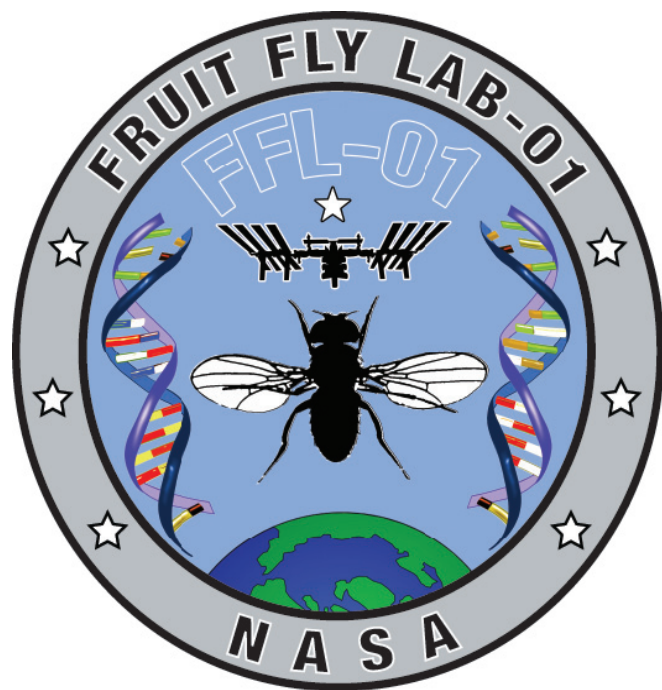
The Fruit Fly Lab provides a research platform aboard the International Space Station for long-duration fruit fly (*Drosophila melanogaster*) experiments in space. Such experiments will examine how microgravity and other aspects of space affect these insects, providing information relevant to long-term human spaceflight, in particular the response to illness. Approximately 77 percent of human disease genes closely match the fruit fly genome.

Fruit fly spaceflight experiments have contributed significantly to our understanding of the effects of microgravity on biological processes that are directly relevant to humans in space. Because of the fly's short lifespan, fruit fly studies provide information at the whole biological system level about the effects of spaceflight on the immune system, the development cycle (birth, growth, reproduction, aging), and behavior. Specific research questions are defined in the National Research Council's 2011 Decadal Survey Report, "Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era."

Historically, short-term fruit fly experiments were transported into Earth's orbit aboard NASA's space shuttle. The International Space Station is the first essentially "permanent" orbiting science laboratory that offers the opportunity for longer-term experiments in space. In 2012, NASA's

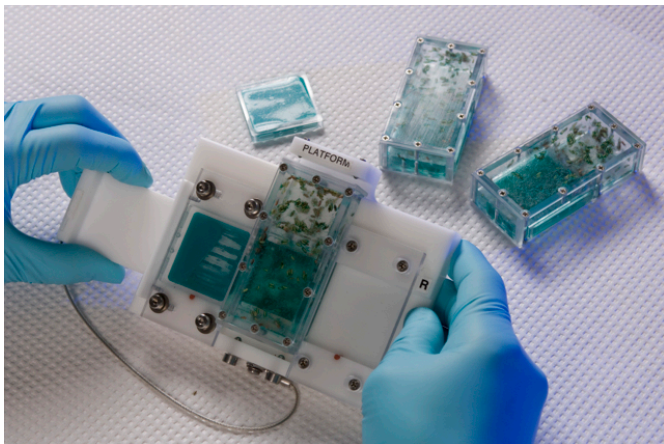
Ames Research Center in Moffett Field, Calif., was authorized to develop the Fruit Fly Lab for research aboard the space station.

This hardware development project leverages the experience gained from prior flight experiments with fruit flies using a space shuttle-based system. Advanced capabilities of the new Fruit Fly Lab include providing environmental and behavioral monitoring for long duration studies that the previous system lacked. In the post-shuttle era, the hardware also must support safe transport of fruit flies on the commercial resupply service vehicle SpaceX Dragon.



Fruit Fly Lab Aboard the International Space Station

The new system has three major components: the Cassette that will house and safely transport fruit flies to the space station; the Food Changeout Platform that astronauts will use periodically to provide fresh food to the flies while maintaining containment and allowing extraction of fruit fly larvae for preservation; and the Observation and Lighting System that allows fly behavior monitoring and exposure to an artificial day/night cycle. The Fruit Fly Lab will provide long-term housing for fruit flies aboard the station in microgravity and at a controlled 1 *g* inside the Nanoracks centrifuge facility.



Fruit Fly Lab Cassettes and Food Changeout Platform.
Image Credit: NASA / Dominic Hart

The first Fruit Fly Lab mission, FFL-01 will launch to the station on SpaceX-5 in 2014. The goals for the first flight are to validate hardware performance and for station crew to demonstrate critical research operations in space, including testing an RNA fixation kit. More than a hundred flies will be aboard the space station for up to 30 days.

The Fruit Fly Lab will be open to principal investigators on the first full science mission, FFL-02, which is scheduled to fly to the

National Aeronautics and Space Administration

Ames Research Center
Moffett Field, CA 94035

www.nasa.gov

International Space Station on SpaceX-9 in 2015.



Drosophila melanogaster, the common fruit fly.
Image Credit: NASA / Dominic Hart

Under the direction of the International Space Station Utilization Office and the Space Biology Project, the Fruit Fly Lab is being developed at Ames, benefiting from the expertise within the Space Biosciences Division. Lockheed Martin and Astrium, GmbH (Germany) are performing hardware development. Lockheed Martin is providing additional science and mission operations support.

This project is supported by the International Space Station Program at NASA's Johnson Space Center, Houston and the Space Biology Project at Ames. Funding for Space Biology comes from the Space Life and Physical Sciences Research and Applications Division within the Human Exploration and Operations Mission Directorate at NASA Headquarters.

For more information, contact:

Kevin Martin
Project Manager
NASA Ames Research Center
kevin.martin@nasa.gov
www.nasa.gov/ames/research/space-biosciences